

**Practice: 606 - Subsurface Drain****Scenario: #1 - Corrugated Plastic Pipe (CPP), Single-Wall, ≤ 6 inch****Scenario Description:**

Description: Below ground installation of perforated HDPE (Corrugated Plastic Pipe) pipeline, using a backhoe. HDPE (CPP) Single-Wall is manufactured in sizes (nominal diameter) from 3-inch to 24-inch; typical practice sizes range from 3-inch to 12-inch; and typical scenario size is 6-inch. Construct 1,000 feet of 6-inch, Single-Wall, perforated HDPE Corrugated Plastic Pipe (CPP), installed below ground to a minimum depth 5 feet. The unit is in length of pipe. The typical number of mainline connections for 1,000 feet of subsurface drainline is ~ 2 each.

Resource Concerns: Excess Water (Seasonal High Water Table); Degraded Plant Condition; Water Quality Degradation (Nutrients).

Associated Practices: 608 - Surface Drain, Main or Lateral; 587 - Structure for Water Control, 533 - Pumping Plant; 606- Underground Outlet, and 554 - Drainage Water Management.

**Before Situation:**

Before installation soil conditions are excessively wet in the spring due to poor internal soil drainage. Excess soil water is causing crop stress and delay of field operations (seed bed preparation, planting, etc.).

**After Situation:**

The drainage modifications result in reduced plant stress due to excessive wetness caused by a seasonal high water table, or improved drainage water quality due to system retrofit enabling drainage water management.

**Scenario Feature Measure:** Length of pipe

**Scenario Unit:** Linear Foot

**Scenario Typical Size:** 1,000

**Scenario Cost:** \$3,660.00

**Scenario Cost/Unit:** \$3.66

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	\$2.29	703	\$1,609.87
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	\$2.03	333	\$675.99
<b>Labor</b>						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$24.74	8	\$197.92
<b>Materials</b>						
Pipe, HDPE, 6", CPT, Single Wall	1242	Pipe, Corrugated Plastic Tubing, Single Wall, 6" diameter - ASTM F405. Material cost only.	Foot	\$1.12	1000	\$1,120.00
Drainage Lateral Connection	1458	Connect 3"-6" drainage lateral to main drain, includes excavation to 6' depth, install tee on main line, connect lateral, and backfill. Includes material cost for tee.	Each	\$28.11	2	\$56.22

**Practice: 606 - Subsurface Drain****Scenario: #2 - Enveloped Corrugated Plastic Pipe (CPP), Single-Wall, ≤ 6 inch****Scenario Description:**

Description: Below ground installation of perforated HDPE (Corrugated Plastic Pipe) pipeline with Sand-Gravel envelope, using a or backhoe. HDPE (CPP) Single-Wall is manufactured in sizes (nominal diameter) from 3-inch to 24-inch; typical practice sizes range from 3-inch to 12-inch; and typical scenario size is 6-inch. Construct 1,000 feet of 6-inch, Single-Wall, perforated HDPE Corrugated Plastic Pipe (CPP), installed below ground to a minimum depth of 5 feet, and surrounded with a sand-gravel envelope lined with geotextile. The unit is in length of pipe. The typical volume sand-gravel for 1,000 feet of 2'wide x 12" high envelope is 74 cubic yards. The typical number of mainline connections for 1,000 feet of subsurface drainline is a total of 2 each.

Resource Concerns: Excess Water (seasonal High Water Table); Degraded Plant Condition; Water Quality Degradation (Nutrients).

Associated Practices: 608 - Surface Drain, Main or Lateral; 587 - Structure for Water Control, 533 - Pumping Plant; 606-Underground Outlet, and 554 - Drainage Water Management.

**Before Situation:**

Before installation soil conditions are excessively wet in the spring due to poor internal soil drainage. Excess soil water is causing crop stress and delay of field operations (seed bed preparation, planting, etc.).

**After Situation:**

The drainage modifications result in reduced plant stress due to excessive wetness caused by a seasonal high water table, or improved drainage water quality due to system retrofit enabling drainage water management.

**Scenario Feature Measure:** length of pipe

**Scenario Unit:** Linear Foot

**Scenario Typical Size:** 1,000

**Scenario Cost:** \$8,852.28

**Scenario Cost/Unit:** \$8.85

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	\$2.29	666	\$1,525.14
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	\$2.03	296	\$600.88
<b>Labor</b>						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$24.74	8	\$197.92
<b>Materials</b>						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	\$34.86	74	\$2,579.64
Drainage Lateral Connection	1458	Connect 3"-6" drainage lateral to main drain, includes excavation to 6' depth, install tee on main line, connect lateral, and backfill. Includes material cost for tee.	Each	\$28.11	2	\$56.22
Pipe, HDPE, 6", CPT, Single Wall	1242	Pipe, Corrugated Plastic Tubing, Single Wall, 6" diameter - ASTM F405. Material cost only.	Foot	\$1.12	1000	\$1,120.00
Geotextile, non-woven, heavy weight	1210	Non-woven greater than 8 ounce/square yard geotextile with staple anchoring. Materials and shipping only.	Square Yard	\$3.84	722	\$2,772.48

**Practice: 606 - Subsurface Drain****Scenario: #3 - Env Corrugated Plastic Pipe (CPP), Single-Wall, ≤ 6 inch, 10 feet deep****Scenario Description:**

Description: Below ground installation of perforated HDPE (Corrugated Plastic Pipe) pipeline with Sand-Gravel envelope, using a backhoe. HDPE (CPP) Single-Wall is manufactured in sizes (nominal diameter) from 3-inch to 24-inch; typical practice sizes range from 3-inch to 12-inch; and typical scenario size is 6-inch. Construct 1,000 feet of 6-inch, Single-Wall, perforated HDPE Corrugated Plastic Pipe (CPP), installed below ground to a depth of 10 feet, and surrounded with a sand-gravel envelope. The unit is in length of pipe. The typical volume sand-gravel for 1,000 feet of 2'wide x 12" high envelope is 74 cubic yards. The typical number of mainline connections for 1,000 feet of subsurface drainline is a total of 2 each.

Resource Concerns: Excess Water (seasonal High Water Table); Degraded Plant Condition; Water Quality Degradation (Nutrients).

Associated Practices: 608 - Surface Drain, Main or Lateral; 587 - Structure for Water Control, 533 - Pumping Plant; 606-Underground Outlet, and 554 - Drainage Water Management.

**Before Situation:**

Before installation soil conditions are excessively wet in the spring due to poor internal soil drainage. Excess soil water is causing crop stress and delay of field operations (seed bed preparation, planting, etc.).

**After Situation:**

The drainage modifications result in reduced plant stress due to excessive wetness caused by a seasonal high water table, or improved drainage water quality due to system retrofit enabling drainage water management.

**Scenario Feature Measure:** length of pipe

**Scenario Unit:** Linear Foot

**Scenario Typical Size:** 1,000

**Scenario Cost:** \$13,944.68

**Scenario Cost/Unit:** \$13.94

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
	1142				1	
<b>Equipment/Installation</b>						
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	\$2.03	1000	\$2,030.00
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	\$2.29	2111	\$4,834.19
<b>Labor</b>						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$24.74	12	\$296.88
<b>Materials</b>						
Drainage Lateral Connection	1458	Connect 3"-6" drainage lateral to main drain, includes excavation to 6' depth, install tee on main line, connect lateral, and backfill. Includes material cost for tee.	Each	\$28.11	2	\$56.22
Geotextile, non-woven, heavy weight	1210	Non-woven greater than 8 ounce/square yard geotextile with staple anchoring. Materials and shipping only.	Square Yard	\$3.84	722	\$2,772.48
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	\$34.86	74	\$2,579.64
Pipe, HDPE, 6", CPT, Single Wall	1242	Pipe, Corrugated Plastic Tubing, Single Wall, 6" diameter - ASTM F405. Material cost only.	Foot	\$1.12	1000	\$1,120.00
<b>Mobilization</b>						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$255.27	1	\$255.27

**Practice: 606 - Subsurface Drain****Scenario: #4 - Corrugated Plastic Pipe (CPP), Single-Wall, ≥ 8 inch****Scenario Description:**

Description: Below ground installation of HDPE (Corrugated Plastic Pipe) pipeline, using a backhoe. HDPE (CPP) Single-Wall is manufactured in sizes (nominal diameter) from 3-inch to 24-inch; typical practice sizes range from 3-inch to 12-inch; and typical scenario size is 10-inch. Construct 1,000 feet of 10-inch, Single-Wall, HDPE Corrugated Plastic Pipe (CPP), installed below ground to a minimum depth 5 feet. The unit is in length of pipe of pipe in feet.

Resource Concerns: Excess Water (Seasonal High Water Table); Degraded Plant Condition; Water Quality Degradation (Nutrients).

Associated Practices: 607 - Surface Drain, Field Ditch; 608 - Surface Drain, Main or Lateral; 587 - Structure for Water Control, 533 - Pumping Plant; and 554 - Drainage Water Management.

**Before Situation:**

Before installation soil conditions are excessively wet in the spring due to poor internal soil drainage. Excess soil water is causing crop stress and delay of field operations (seed bed preparation, planting, etc.).

**After Situation:**

The drainage modifications result in reduced plant stress due to excessive wetness caused by a seasonal high water table, or improved drainage water quality due to system retrofit enabling drainage water management.

**Scenario Feature Measure: Weight of Pipe****Scenario Unit: Linear Foot****Scenario Typical Size: 1,000****Scenario Cost: \$12,745.96****Scenario Cost/Unit: \$12.75****Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	\$2.29	740	\$1,694.60
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	\$2.03	278	\$564.34
<b>Labor</b>						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$24.74	8	\$197.92
<b>Materials</b>						
Pipe, HDPE, 10", PCPT, Single Wall	1273	Pipe, Corrugated Plastic Tubing, Single Wall, Perforated, 10" diameter - ASTM F667. Material cost only.	Foot	\$3.84	1000	\$3,840.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	\$34.86	185	\$6,449.10

**Practice: 606 - Subsurface Drain****Scenario: #5 - Corrugated Plastic Pipe (CPP), Twin-Wall, ≥ 8 inch****Scenario Description:**

Description: Below ground installation of HDPE (Corrugated Plastic Pipe) pipeline, using a backhoe. HDPE (CPP) Twin-Wall is manufactured in sizes (nominal diameter) from 4-inch to 60-inch; typical practice sizes range from 8-inch to 15-inch; and typical scenario size is 12-inch. Construct 1,000 feet of 12-inch, Twin-Wall, HDPE Corrugated Plastic Pipe (CPP), installed below ground to a minimum depth 5 feet. The unit is in length of pipe in feet.

Resource Concerns: Excess Water (Seasonal High Water Table); Degraded Plant Condition; Water Quality Degradation (Nutrients).

Associated Practices: 607 - Surface Drain, Field Ditch; 608 - Surface Drain, Main or Lateral; 587 - Structure for Water Control, 533 - Pumping Plant; and 554 - Drainage Water Management.

**Before Situation:**

Before installation soil conditions are excessively wet in the spring due to poor internal soil drainage. Excess soil water is causing crop stress and delay of field operations (seed bed preparation, planting, etc.).

**After Situation:**

The drainage modifications result in reduced plant stress due to excessive wetness caused by a seasonal high water table, or improved drainage water quality due to system retrofit enabling drainage water management.

**Scenario Feature Measure:** length of pipe

**Scenario Unit:** Linear Foot

**Scenario Typical Size:** 1,000

**Scenario Cost:** \$19,317.62

**Scenario Cost/Unit:** \$19.32

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Equipment/Installation</b>						
Compaction, earthfill, vibratory plate	1260	Compaction of earthfill with a walk behind vibratory plate compactor in typical 6-8 inch thick lifts, 2 passes. Includes equipment and labor.	Cubic Yard	\$2.03	333	\$675.99
Excavation, Common Earth, side cast, small equipment	48	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	\$2.29	888	\$2,033.52
<b>Labor</b>						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$24.74	8	\$197.92
<b>Materials</b>						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	\$34.86	222	\$7,738.92
Pipe, HDPE, corrugated double wall, ≤ 12", soil tight, weight priced	1587	High Density Polyethylene (HDPE) compound manufactured into double wall corrugated pipe ≤ 12" diameter. Materials only.	Pound	\$2.63	3200	\$8,416.00
<b>Mobilization</b>						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$255.27	1	\$255.27

**Practice: 606 - Subsurface Drain****Scenario: #6 - 4 inch PVC Footing Drain w/ geotextile fabric****Scenario Description:**

Description: Below ground installation of 4" Perf PVC to improve soil drainage. Installed where greater strength is needed under high traffic areas; in locations where replacement may be difficult; or in conjunction with other structural conservation practices to remove excess water and ensure proper function of that practice. Pipe usually installed in a crushed stone envelope, w/ geotextile around base of structure.

Resource Concerns: Excess Water (Seasonal High Water Table); Water Quality Degradation (Nutrients). Per practice it supports.

Associated Practices: 607 - Surface Drain, Field Ditch; 608 - Surface Drain, Main or Lateral; 587 - Structure for Water Control, 533 - Pumping Plant; 606 Underground Outlet, 313 Waste Storage Facility, and 554 - Drainage Water Management.

**Before Situation:**

Before installation soil conditions are excessively wet due to poor internal soil drainage. Excess soil water threatens stability/functionality of proposed conservation practice.

**After Situation:**

The drainage modifications result in improved drainage of groundwater to ensure function and longevity of supporting practice.

**Scenario Feature Measure:** length of pipe

**Scenario Unit:** Foot

**Scenario Typical Size:** 100

**Scenario Cost:** \$682.08

**Scenario Cost/Unit:** \$6.82

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Labor</b>						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$24.74	4	\$98.96
<b>Materials</b>						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	\$34.86	8	\$278.88
Pipe, PVC, 4", SDR 26	989	Materials: - 4" - PVC - SDR 26 160 psi - ASTM D2241	Foot	\$2.20	100	\$220.00
Geotextile, non-woven, light weight	1209	Non-woven less than 8 ounce/square yard geotextile with staple anchoring. Materials and shipping only.	Square Yard	\$1.08	78	\$84.24

**Practice: 606 - Subsurface Drain****Scenario: #7 - 6 inch Corrugated Plastic Pipe Footing Drain****Scenario Description:**

Description: Below ground installation of 6" Perf corrugated plastic pipe to improve soil drainage. Installed along structures footings; or in conjunction with other structural conservation practices to remove excess water and ensure proper function of that practice. Pipe usually installed in a crushed stone envelope around base of structure. All excavation is included in other associated practice(s).

Resource Concerns: Excess Water (Seasonal High Water Table); Water Quality Degradation (Nutrients). Per practice it supports.

Associated Practices: 607 - Surface Drain, Field Ditch; 608 - Surface Drain, Main or Lateral; 587 - Structure for Water Control, 533 - Pumping Plant; 606 Underground Outlet, 313 Waste Storage Facility, and 554 - Drainage Water Management.

**Before Situation:**

Before installation soil conditions are excessively wet due to poor internal soil drainage. Excess soil water threatens stability/functionality of proposed conservation practice.

**After Situation:**

The drainage modifications result in improved drainage of groundwater to ensure function and longevity of supporting practice.

**Scenario Feature Measure:** length of pipe

**Scenario Unit:** Foot

**Scenario Typical Size:** 100

**Scenario Cost:** \$489.84

**Scenario Cost/Unit:** \$4.90

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Labor</b>						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$24.74	4	\$98.96
<b>Materials</b>						
Pipe, HDPE, 6", CPT, Single Wall	1242	Pipe, Corrugated Plastic Tubing, Single Wall, 6" diameter - ASTM F405. Material cost only.	Foot	\$1.12	100	\$112.00
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	\$34.86	8	\$278.88

**Practice: 606 - Subsurface Drain****Scenario: #8 - 6 inch Footing Drain w/ Geotextile Fabric****Scenario Description:**

Description: Below ground installation of 4" Perf PVC or 6" Perf corrugated plastic pipe to improve soil drainage. PVC installed where greater strength is needed under high traffic areas; in locations where replacement may be difficult; both installed in conjunction with other structural conservation practices to remove excess water and ensure proper function of that practice. Pipe usually installed in a crushed stone envelope, w/ geotextile around base of structure. All excavation is included in other associated practice(s).

Resource Concerns: Excess Water (Seasonal High Water Table); Water Quality Degradation (Nutrients). Per practice it supports.

Associated Practices: 607 - Surface Drain, Field Ditch; 608 - Surface Drain, Main or Lateral; 587 - Structure for Water Control, 533 - Pumping Plant; 606 Underground Outlet, 313 Waste Storage Facility, and 554 - Drainage Water Management.

**Before Situation:**

Before installation soil conditions are excessively wet due to poor internal soil drainage. Excess soil water threatens stability/functionality of proposed conservation practice.

**After Situation:**

The drainage modifications result in improved drainage of groundwater to ensure function and longevity of supporting practice.

**Scenario Feature Measure:** length of pipe

**Scenario Unit:** Foot

**Scenario Typical Size:** 100

**Scenario Cost:** \$818.10

**Scenario Cost/Unit:** \$8.18

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Labor</b>						
General Labor	231	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$24.74	4	\$98.96
<b>Materials</b>						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	\$34.86	15	\$522.90
Pipe, HDPE, 6", CPT, Single Wall	1242	Pipe, Corrugated Plastic Tubing, Single Wall, 6" diameter - ASTM F405. Material cost only.	Foot	\$1.12	100	\$112.00
Geotextile, non-woven, light weight	1209	Non-woven less than 8 ounce/square yard geotextile with staple anchoring. Materials and shipping only.	Square Yard	\$1.08	78	\$84.24